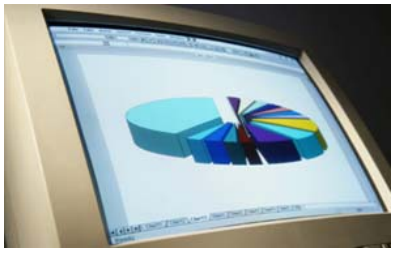
UMASS DONAHUE INSTITUTE • RESEARCH & EVALUATION GROUP

Massachusetts Department of Elementary and Secondary Education

Partnership for Online Professional Development

Summary of Findings – Spring 2008


Contents

Executive Summary

This report summarizes the evaluation of the Partnership for Online Professional Development (POPD), a pilot program being implemented by the Massachusetts Department of Elementary and Secondary Education (ESE) through NCLB Title IID. The program is designed to improve teaching practices, promote student learning, and provide capacity-building solutions through the use of Massachusetts Online Network for Educators (MassONE) and other innovative educational practices.

ESE provided funding to eight projects throughout the state including: Brockton, Cambridge, Easthampton, Community Day Charter (Lawrence), New Bedford, Smith Vocational (Northampton), Springfield, and Winchendon. Cambridge piloted the first course in fall 2007. All other courses were piloted during the winter of 2008 and were offered to educators in the districts receiving the POPD grants, their partners, and other educators on a space available basis. This report includes data from each of the eight grant recipients (nine courses). In the summer of 2008, the courses will be offered statewide on a space-available basis, with preference given to educators from the districts receiving the POPD grants.

The data sources for the evaluation included pre-course surveys (n=199), post-course surveys (n=157), content-specific pre- post-tests for each course (n=150), and phone interviews with participants from each of the courses (n=19). Among the several criteria for success of POPD courses are the extent to which the data generated by these surveys, tests, and interviews reveal the following: (1) Content-specific pre- post-test items show gains in content knowledge upon completion of the course, (2) Participants provide consistently positive course ratings on evaluation instruments, (3) Participants provide specific feedback related to increased content knowledge and pedagogy skills as a result of participation in the course. Based on the available data, all courses were successful in meeting previously defined course success criteria.

- In every course, the results of pre- post-testing indicated improvements in content knowledge, many of which were statistically significant.
- 93 percent of all participants indicated their course met or exceeded their expectations and 89 percent of all participants rated the overall course as excellent or good.
- 91 percent rated the overall effectiveness of the instructor as excellent or good and 86 percent indicated they would recommend the course they took to a colleague.
- 95 percent agreed or strongly agreed that the course was well organized and that the learning objectives for the course were clearly documented.
- 87 percent agreed or strongly agreed that the instructor inspired interest in the course.
- 89 percent indicated that the instructor provided clear expectations regarding participation in discussion forums and 82 percent reported that the instructor encouraged participants to provide feedback to each other.
- 82 percent reported the instructor provided timely feedback and 78 percent indicated that instructor feedback was useful.

- 90 percent indicated that required readings enhanced understanding of course content and that course assignments and final projects were valid measures of course content and objectives

- 92 percent were able to navigate through the MassONE Moodle system to reach all course components and 90 percent reported that access to MassONE was reliable and available.

The most significant course strengths noted included:

- high quality of course content
- opportunity to communicate with professionals from other schools/districts and to share material, resources, and ideas
- applicability of course materials and resources to classroom teaching (e.g., generated new ideas for lesson plans, technology, games, and activities for participants' classrooms)
- clarity of course design—courses were well organized, with clear objectives, expectations and assignments
- stimulation of new thinking
- convenience of learning online
- high quality instructors

The most frequently notes course challenges included:

- having/making enough time to complete course requirements—very rigorous courses
- general technological issues
- specific course content (e.g., difficult concepts, challenged participants' ways of thinking, transferring content to the classroom)

Recommendations for improvement were somewhat limited and included a few suggestions for enhancing the interactions among course participants, the possibility of scheduling times when class members could come together online to discuss material (e.g., weekly chat sessions), and/or having a face-to-face session at the end of the course to interact with classmates in person.

Introduction

This report summarizes the evaluation of the Partnership for Online Professional Development (POPD), a pilot program being implemented by the Massachusetts Department of Elementary and Secondary Education (ESE) through NCLB Title IID. The program is designed to improve teaching practices, promote student learning, and provide capacity-building solutions through the use of Massachusetts Online Network for Educators (MassONE) and other innovative educational practices.

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A summary of participating courses disaggregated by content area (and grant recipient) is presented in the table below.

Science
Every Student Is a Champion: Assistive Technology and Universal Design (Brockton Public Schools)
Teaching Earth and Space Science (Easthampton Public Schools)
Teaching Elementary Life Science (Easthampton Public Schools)
Teaching Electricity and Circuits through Inquiry (New Bedford Public Schools)
Mathematics
Algebraic Thinking: Differentiating to Reach All Learners (Winchendon Public Schools)
Building a Number Sense Toolkit: Using Data to Teach and Assess (Community Day Charter Public School)
Fractions for Elementary School Teachers (Springfield Public Schools)
Using Real Data in the Math Classroom (Cambridge Public Schools)
English language arts
Reading Comprehension Strategies and Universal Design for Learning (Smith Vocational & Agricultural HS)

The UMass Donahue Institute is conducting the evaluation of the POPD project. The specific evaluation questions to be addressed in this report include the following:

1. To what extent do courses:
   a) meet the Massachusetts Recommended Criteria for Distance Learning Courses[1]
   b) meet the content of the Massachusetts Curriculum Frameworks[2]
   c) align with the 2007 Massachusetts Professional Development Institutes four general stages of implementing standards-based instruction[3]

2. To what extent are courses successful in:
   a) improving participants' content-specific subject matter knowledge in the specific grade levels
   b) improving participants' teaching of the content-specific subject matter knowledge in the specific grade levels

The criteria for success of POPD courses included the extent to which courses:

- Met the Massachusetts Recommended Criteria for Distance Learning Courses, including the following:
  - Participants are encouraged to take part in online discussions, work together in online group activities, and provide feedback to one another to improve their practice.
  - The online instructor sets clear expectations regarding the amount and quality of participation required.
  - The online instructor monitors participants' discussions and postings of work on a daily basis and responds to participants' inquiries within 24 hours/
  - The course includes appropriate pre- and post-assessments, which may include written exams or documentable products such as lesson plans and curriculum units.
  - The online instructor continually assesses participants' involvement and mastery of the content by monitoring their participation in online discussions, the quality of participant postings, and completed assignments.
  - The assessments are valid measures of participants' mastery of the content objectives.
- Met the content of the Massachusetts Curriculum Frameworks.[4]
- Aligned with the 2007 Massachusetts Professional Development Institutes' four general stages of implementing standards-based instruction.
- Were successful in improving participants' content knowledge and pedagogy related to the course.
  - Content-specific pre- post-test items show gains in content knowledge upon completion of the course.
  - Participants provide consistently positive course ratings on evaluation instruments.
  - Participants provide specific feedback related to increased content knowledge and pedagogy skills as a result of participation in the course.

The data sources for this report included pre-course surveys, post-course surveys, individual content-specific pre-post-tests for each course, and phone interviews with participants from each of the courses. The body of the report is organized into the following sections:

Methodology – Provides a description of instrument development, distribution, response rates, and analyses of all evaluation tools.

Results – Provides a brief overview of each course and key findings related to each of the following: pre-course surveys, post-course surveys, pre- post-tests, and phone interviews with course participants.

[1] Specific success criteria were re-created from relevant text within this ESE document: http://www.doe.mass.edu/edtech/news03/distance_learning.pdf
[2] http://www.doe.mass.edu/frameworks/current.html
[3] http://www.doe.mass.edu/frameworks/cinstitute/07/guidelines.doc
[4] The Curriculum Frameworks for each course was different, depending upon grade level and subject matter of the course, and were monitored by each course provider.

Conclusion – Provides an overall summary of findings.

Appendix – Includes the findings from post-course surveys, disaggregated by course.

Methodology

This section of the report provides a descriptive summary of the instruments developed for the POPD project, distribution of surveys and pre- post-tests, response rates, and analyses of all evaluation tools.

Instrument Development

In order to provide an overall picture of POPD participants and to learn about participants' impressions, impacts, and suggestions for the courses, pre- and post-course surveys were developed. The surveys consisted of a mixture of closed and open-ended response items. Closed-response items included Likert-type scale items. Questions and scales were designed collaboratively by the Institute and the ESE project coordinators. Changes were made through an iterative process of drafts and feedback.

Content-specific pre- post-test items were developed by each of the course providers, most of who worked collaboratively with the Institute during the development of items. ESE also provided an outline format for all providers based on the 2006 DOE Content Institutes. Most of the pre- post-tests contained several multiple choice questions and one to two open-ended response items. Specific grading rubrics were designed for all open-ended response items. Changes were made to the pre- post-tests through an iterative process of drafts and feedback.

A set of open-ended questions was also created in order to conduct brief phone interviews with participants upon completion of their courses. These questions were developed by the Institute and reviewed by ESE staff before being utilized during the preliminary pilot of the fall 2007 course. Based on responses provided by these course participants, the questions were revised slightly before being administered to course participants during the spring 2008 session.

Both surveys and most pre- post-tests were developed online via the MassONE survey tool. Due to some issues with graphical needs that could not be addressed within MassONE however, the Fractions course developed their pre- post-test within the Moodle system and the Algebraic Thinking course developed their pre- post-test on Survey Monkey.

Response Rates

Course facilitators instructed participants to complete the pre-course survey and pre-test before beginning each course and to complete post-course surveys and post-tests upon completion of their course. Twenty-five participants from the spring 2008 courses were also randomly selected to participate in phone interviews regarding some of their experiences in their course and with the Moodle system[5].

The specific number of responses to each evaluation instrument is provided in the table below[6].

Course	Pre-course survey	Post-course survey	Pre-Post Tests	Phone Interviews
Algebraic Thinking	24	21	19	3
Circuits	23	22	21	2
Earth Space Science	19	11	9	2
Elementary Life Science	29	15	14	1

[5] Four participants were randomly selected from the Real Data course during the fall 2007 pilot of this course.
[6] Response rates for Earth Space Science and Life Science post-courses surveys and post-tests were low due to participant issues accessing the online instruments.

Course	Pre-course survey	Post-course survey	Pre-Post Tests	Phone Interviews
Fractions	18	15	15	1
Number Toolkit	24	20	21	3
UDL Brockton	17	16	17	3
UDL Smith Vocational	22	19	19	2
Using Real Data	23	18	15	2
Total	199	157	150	19

Quantitative Analysis of Valid Responses

The foundations of the report are descriptive statistics (frequencies and mean scores) based on the available survey responses. The total number of valid responses for any particular question may vary because some individuals, either intentionally or inadvertently, failed to answer one or more of the questions, and other individuals failed to complete the survey at all.

Since pre- post-tests across courses were not on the same scale, a gain score for each individual was calculated as the difference between the pre-test and post-test score based on 100 percent. The mean of these individual gain scores for each course represents the mean gain. To determine the statistical significance of these gains, a paired sample t-test was computed on the scores for each district[7].

Qualitative Analysis of Open-Ended Responses

Open-ended responses to surveys and phone interviews were entered into a database and analyzed using a standard qualitative technique. The approach involved multiple readings of the data set and the assignment of themes around recurring ideas. Once themes were identified, each response was coded by its appropriate theme. The coded responses were then read and re-read in their thematic grouping to further identify patterns. In cases where there was a large diversity of responses, summary information related to the diversity is also provided. The findings of the qualitative analysis are referred to in the body of the report.

[7] Due to an inability to match pre- and post-test data from the Algebraic Thinking course, an independent sample t-test was conducted to determine whether there were statistically significant differences between pre- and post-test scores in this course.

Results

This section of the report includes a brief overview of each course, findings from pre-course surveys, post-course surveys, content-specific pre- post-tests, and phone interviews with participants. Results are presented in aggregate form in the body of the report. Post-course survey responses are also disaggregated by course and are provided in Appendix A.

Course Summaries

An overview of each course is presented, including summary information regarding the course provider, subject matter, grade-level, and district in which each course was developed.

Every Student is a Champion: Assistive Technology and Universal Design for Learning Strategies to Support Middle School Students in Science

This Science and Technology/Engineering course was developed for middle school teachers in the Brockton public school district by the Massachusetts Elementary School Principals' Association (MESPA). MESPA is the largest professional school administrators' organization in Massachusetts. They provide extensive face to face and online professional development programs and courses for all educators, Pre-K–12. This online course addressed the skills, strategies, and devices necessary to create a universally designed classroom that maximizes every student's ability to achieve at high levels. The course targeted general and special educators in grades 6–8 and focused on the development and integration of universally designed supports for reading and writing skills in science. Teachers learned to employ varied strategies in working with students (whole class, small group, peer to peer, individual) in order to address the needs of their students as well as to provide multiple options for students' expression of their understanding of skills and concepts.

Teaching Elementary Life Science

This Science and Technology/Engineering course was developed for K–6 teachers in the Easthampton public school district by PBS TeacherLine. The course was adapted by WGBY, the local course provider for PBS TeacherLine and a resource for offering online professional development to individual Pre-K–12 teachers and districts. The Teaching Elementary Life Science course was designed to enhance educators' understanding and teaching of life science. It began with the principles of constructivist learning, inquiry, and exploration-based science. Throughout, the emphasis on content gave teachers a comprehensive understanding of life science to increase students' understanding at an elementary level. The course concluded with the development of a curriculum design project and a final assessment.

Teaching Earth and Space Science

This Science and Technology/Engineering course was also developed by PBS TeacherLine and adapted by WGBY for K–8 teachers in the Easthampton public school district. The course focused on three elements: content knowledge, inquiry and other teaching strategies, and use of multimedia and visualization tools in teaching and learning. Course goals included developing content knowledge about Earth's history, weather and climate, the Sun-Earth-Moon system, following inquiry-based learning models, introducing a media-rich learning

environment to use with students, and providing effective teaching methodologies, strategies, and tools for use in teaching earth and space science concepts. This course will not be offered during the summer 2008 session[8].

Teaching Electricity and Circuits through Inquiry

This Science and Technology/Engineering course was developed for grade 3–5 teachers in the New Bedford public school district by EdTech Leaders Online (ETLO). ETLO is based in the Center for Online Professional Education at Education Development Center (EDC), a large education non-profit based in Newton, Massachusetts. ETLO is a nationally recognized, capacity-building online professional development program that provides online facilitator and course developer training and a catalogue of over 40 standards-based online workshops in specific K–12 subject areas and grade levels. The Teaching Electricity and Circuits through Inquiry course was designed to teach participants about the science behind electric circuits and how this content can be taught through inquiry. The course helped teachers gain a better understanding of electricity and circuit content, including conducting and insulating materials, open and closed circuits, series and parallel circuits, and electromagnets. Participants considered inquiry-based methods to introduce the content to students and enhance their questioning techniques to help students make predictions about electricity and circuits. The final project required participants to demonstrate the key concepts they learned and to apply the teaching methods introduced in the course.

Algebraic Thinking: Differentiating to Reach All Learners

This mathematics course was also developed by ETLO/EDC for grade 4–10 teachers in the Winchendon public school district. The Algebraic Thinking course introduced participants to a framework for describing algebraic thinking, seeing and creating opportunities for algebraic thinking in classroom activities, and identifying evidence of algebraic thinking in students' work. Participants learned ways to apply principles of differentiated instruction specifically to mathematics teaching. Technology tools and Web-based materials were used to provide important ways for mathematics educators to meet key standards that emphasize problem solving and connections between mathematics, other disciplines, and the real world. This course provided participants with a variety of activities and problems that promoted algebraic thinking, introduced them to online tools, and guided them in using principles of differentiated instruction to adapt existing lessons to promote richer algebraic thinking.

Building a Number Sense Toolkit: Using Data to Understand, Teach, and Assess Number Sense Standards

This mathematics course was developed for grade 3–8 teachers in the Community Day Charter School and the Lawrence public school district by Community Partners Initiative (CPI). CPI is the training division of The Community Group, an educationally focused nonprofit that has successfully provided early education and elementary education programs since 1970. The Building a Number Sense Toolkit course was designed for mathematics teachers with a range of experience levels. Course participants analyzed Massachusetts number sense standards and examined how to use data to effectively teach and assess number sense concepts. Other topics that the course addressed included: the role of vocabulary and discussion in the development of students' number sense, curriculum mapping of number sense standards, using MCAS data as a lens on students' mathematical understanding, and teaching and assessing open response questions related to number sense. The course included one face-to-face session comprised of three hours of course content and an optional three-hour technology support session. The course also included ongoing online discussions, small group activities, relevant readings, and a final project.

[8] Easthampton was the only district offering two courses during Phase I of the pilot program. The course was very well received and is not being offered during the summer 2008 "Train the Trainer" phase of the project due to time constrictions (not because of any shortcoming related to the course).

Fractions for Elementary School Teachers

This mathematics course was developed for K–5 teachers in the Springfield public school district by Virtual High School Global Consortium (VHS). VHS is a collaborative of over 450 middle and high schools in 28 states and 35 international schools working together to offer online courses to students. VHS offers online professional development to prepare classroom teachers to teach online, and provides the administrative, management, technical, and training support needed to design and deliver high-quality, innovative, core technical and elective courses over the Internet. The Fractions for Elementary Teachers course was designed to promote the understanding of fractions for elementary school teachers both from a conceptual and mechanical perspective. Each participant created a standards-based portfolio of lessons, specific to their own grade level, to teach fractions to their own students.

Using Real Data in the Math Classroom

This mathematics course was developed by ETLO/EDC for middle and high school teachers in the Cambridge public school district. The course was designed to explore a range of Web-based resources and exemplary projects which utilize technology. Participants learned how to find sources of real data on the Web and explore how technology tools such as spreadsheets can help students analyze, visualize, and make sense of these data. Technology tools and Web-based materials provided important ways for mathematics educators to meet key NCTM standards and Massachusetts Frameworks that emphasize problem solving and making connections between mathematics, other disciplines, and the real world. These standards include a significant emphasis on representing and analyzing data, including a focus on being able to evaluate the sources of data and the effectiveness of different representations that students will encounter both in and out of school.

Reading Comprehension Strategies and Universal Design for Learning for the Middle and High School Teacher

This Universal Design for Learning (UDL) course was developed for English language arts, social studies, and science grade 6–12 teachers in the Smith Vocational & Agricultural public school district by the Center for Applied Special Technology (CAST). Founded in 1984, CAST is a nonprofit education research and development organization that works to expand learning opportunities for all individuals, including those with disabilities, through UDL. This course concretized the principles, applications, and research background of UDL by exploring how instructional technologies can be used effectively, how digital media can increase the accessibility of core instructional materials and textbooks, and how these tools and supports can support middle and high school students in developing reading comprehension and vocabulary skills.

Pre-Course Survey

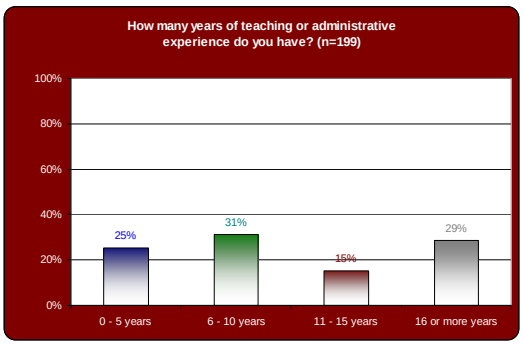
Pre-course surveys included several demographic questions and questions pertaining to participants' experience levels and perceptions of a variety of items. All data is reported in aggregate form.

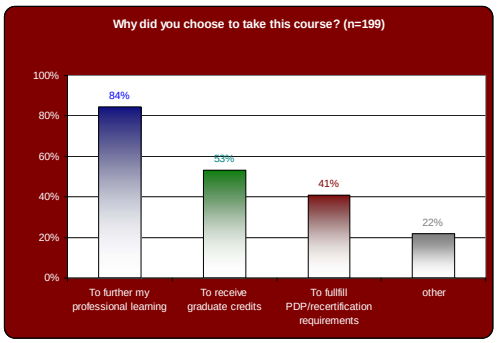
Participants came from a variety of teaching levels, with elementary and middle school teachers comprising approximately half of all respondents. The table on the following page includes a specific breakdown of participants' employments status.

Which of the following best describes your current employment status?	N	%
Grade 3-5 Teacher	41	20.9
Middle School Teacher	39	19.9
Special Education Teacher	26	13.3
High School Teacher	17	8.7
K-2 Teacher	13	6.6
Technology Coordinator or Director	13	6.6
Curriculum Coordinator or Director	5	2.6
Library Media Specialist	2	1.0
Department Head	2	1.0
Other Administrator	4	2.0
Other	34	17.3
Total	196	100.0

"Other" responses included the following: math teacher (n=5), science teacher PreK-5 (n=3), math instructional leadership specialist (n=3), adult education teacher, ESL teacher, K–12 teacher, literacy coach, teacher of the deaf, technology teacher grades 1–6, and Title One teacher (n=2 for each of these responses). The final "other" responses included attendance officer, district math coach, ESE employee, facilitator, generalist, grade 5 inclusion teacher, on leave, reading coach, and resource teachers K–5 (n=1 for each of these responses).

The teaching and/or administrative experience of respondents ranged from five years or less (25 percent) to more than 16 years (29 percent). When asked to indicate why they enrolled in the course, most participants (84 percent) reported an interest in furthering their professional learning, approximately half were interested in receiving graduate credit and 41 percent indicated they took the course to fulfill PDP or certification requirements.[9]





More than two-thirds of all respondents (69.7 percent) had never taken an online course or had only taken one online course prior to participating in the POPD course.

How many online courses have you taken prior to this course?	N	%
0	85	45.2%
1	46	24.5%
2	16	8.5%
3 - 5	18	9.6%
6 - 10	15	8.0%
11 - 25	8	4.3%
Total	188	100.00%

[9] Participants were asked to "choose all that apply". For this reason, totals exceed 100%.

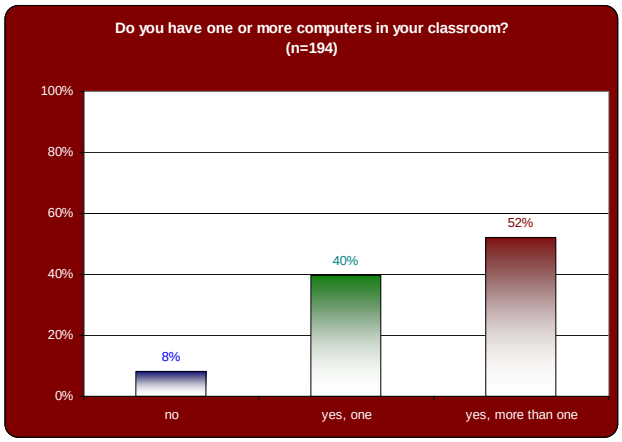
Most (91 percent) had cable or DSL Internet access at home, 7 were currently using dial-up, and 3 did not have any Internet access at home. “Other” responses included FIOS (n=3), satellite (n=2), and high speed wireless (n=1).

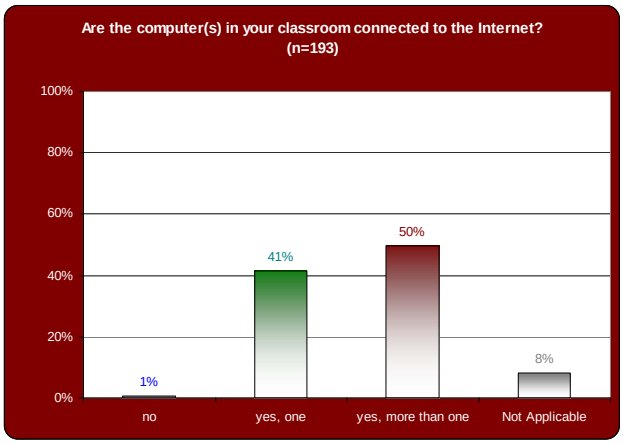
What type of Internet access do you have at home?	N	%
Cable	115	57.8%
DSL	66	33.2%
Dial-up	7	3.5%
Other	6	3.0%
None	3	1.5%
Don't Know	2	1.0%
Total	199	100.0%

Approximately 40 percent of all respondents did not know what type of Internet was being used at their school. Another 40 percent indicated their schools had T3 or T1 or cable connection and 3 respondents reported their school was using dial-up Internet. “Other” responses included “very slow” (n=3), satellite (n=2), wireless (n=2), intermittent (n=1), and network (n=1).

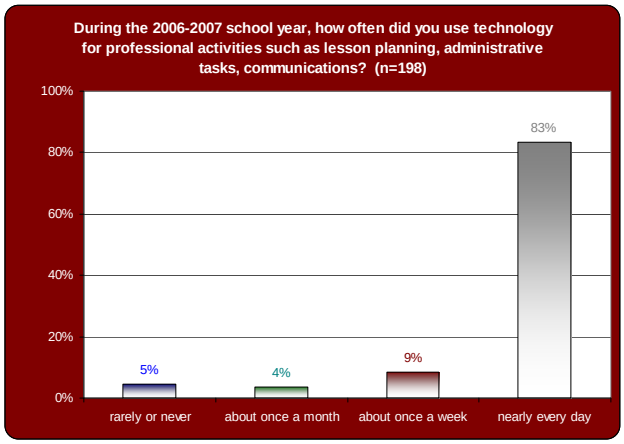
What type of Internet access do you have at school?	N	%
Don't Know	77	38.9%
T3 or T1	45	22.7%
Cable	32	16.2%
DSL	31	15.7%
Other	10	5.1%
Dial-up	3	1.5%
Total	198	100.0%

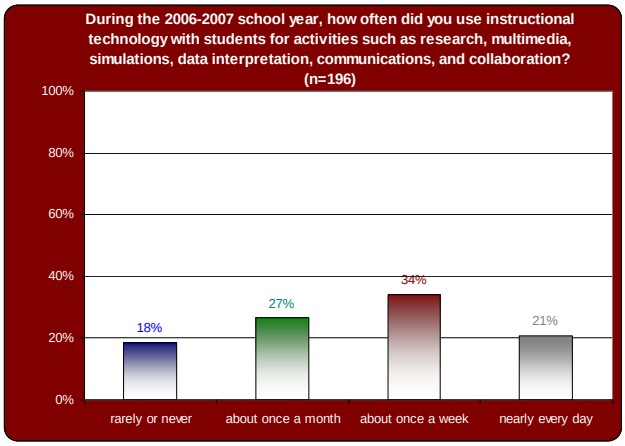
Most participants indicated they had one or more computers in their classroom and access to the Internet on the computers in their classroom. This was not the case for all participants however.



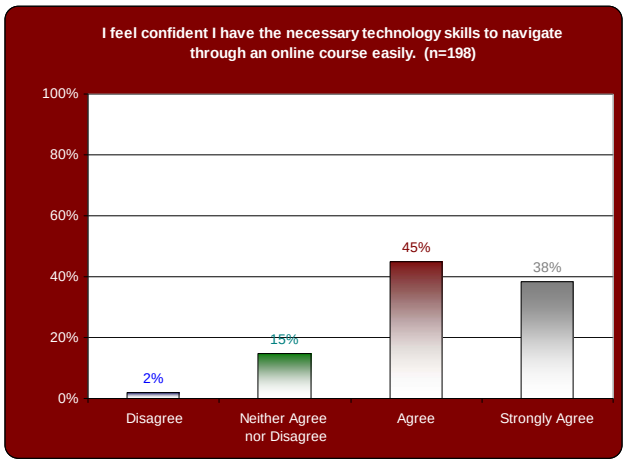


Over 80 percent of respondents indicated they use technology skills on a daily basis for professional activities, though this figure decreased dramatically when related to student activities.





Eighty-three percent of participants reported confidence in their abilities to navigate through an online course.



The majority of participants had never taught an online course previously (93 percent). The responses for those who had taught a course in the past ranged from 1 course to 27 courses.

How many online courses have you taught?	N	%
0	177	92.7%
1	5	2.6%
2	1	0.5%
3	2	1.0%
6	1	0.5%
7	1	0.5%
10	1	0.5%
12	2	1.0%
27	1	0.5%
Total	191	100.0%

Almost one-third of all participants were taking the course as part of a team from their school or district and most had not taken a course through MassONE or Moodle previously.

Are you taking this course as part of a team from your school or district?	N	%
no	136	69.0
yes	61	31.0
Total	197	100.0

Have you ever taken a course through MassONE before?	N	%
no	174	88.3
yes	23	11.7
Total	197	100.0

Have you ever taken a course through Moodle before?	N	%
no	181	91.4
yes	17	8.6
Total	198	100.0

The pre-course survey also asked respondents to indicate what their expectations and/or concerns were related to the course and to provide any additional comments as relevant. Course participants provided 186 survey responses about course expectations. These included two major categories, pedagogy and content, and seven minor categories: technology, curriculum, ideas, "no expectations," collaboration, universal design, and "other."

Participants' most frequently mentioned expectations of their POPD course were improved pedagogy (n=90, 48 percent) and increased content knowledge. Responses were considered as pedagogically related if they mentioned improved teaching of the content or of style, and when specifically related to classroom performance. One-third of all responses (n=62) specifically cited expecting the POPD courses to increase and improve participants' knowledge of the content used within their classrooms. Adding responses that alluded directly to course expectations of improving classroom content (e.g., content comfort, better content use, and hands-on content), the content responses increased to 49 percent (n=91). Including responses that indirectly alluded to or might overlap with improved content knowledge (e.g. refresh knowledge, new ideas), the responses grew to 57 percent (n=106). Together, content and pedagogy comprised well over half of all categorized comments representing the bulk of POPD expectations.

A distant third in participants' expectations (n=34) were remarks about encountering or gaining experience with online training, Web-based resources, and computer-related technology. Many comments simultaneously expressed concerns, along with positive expectations, about having sufficient technological skills for teaching or learning online. Seventeen respondents specifically mentioned curricular improvement expectations. Sixteen respondents expected to encounter new ideas, personal growth, excitement, and "recharging" through the POPD course. Thirteen respondents reported no expectations. Eleven looked forward to learning about better collaborative techniques and experiences and 10 expected to learn more about universal design and assistive devices for the classroom. Of the last nine comments categorized as "other," five expected to gain knowledge about using data, three expected better knowledge about ESE goals, and one expected to gain "confidence" from the course.

Thirteen participants specified having no concerns and 38 voiced specific concerns about their upcoming course. Of those expressing concerns, approximately 45 percent (n=17) mentioned concerns about the online format, limited online experience, technical difficulties with posting, online notebooks, computing skills, Web services,

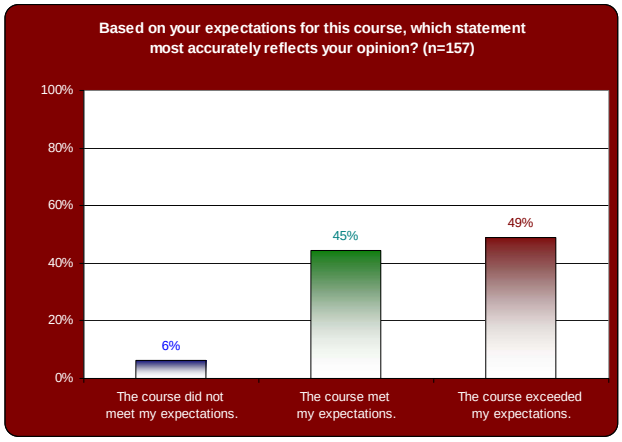
and being able to get help. Another 37 percent (n=14) expressed concern about the workload, time constraints, the level of difficulty, and an inadequate background and/or abilities related to the course.

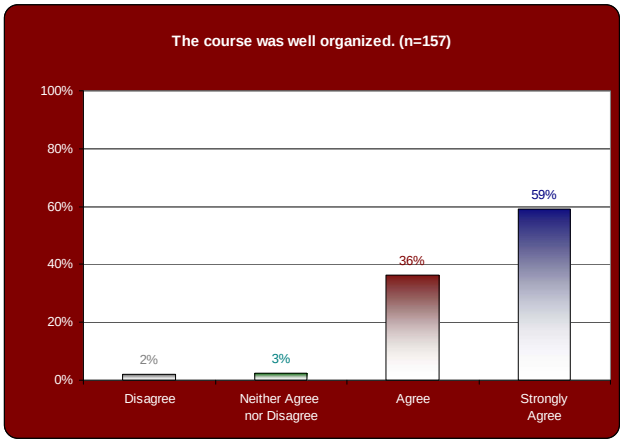
Of the 55 "other comments" provided by participants, about half (n=26) were positive and indicated excitement and anticipation about taking their course. Almost as many (n=23) reiterated specific concerns about their upcoming course. Participants expressed concerns that their upcoming course may require too many hours of work, and/or the possibility that participants may not have the necessary technical skills or content background to be successful in their course.

Post-Course Survey

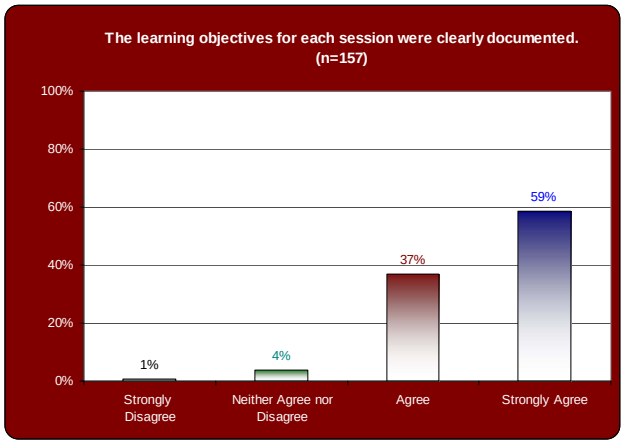
Post-course surveys included several Likert scale items asking participants to rate various aspects of their course experience. The survey also asked participants to indicate what they believed the most significant course strengths and challenges were and suggestions for course improvement. The following data is reported in aggregate form, though responses to scale items disaggregated by course are presented in Appendix A.

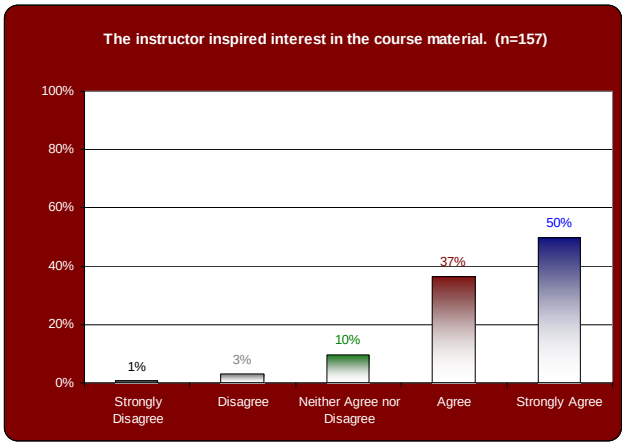
One hundred and fifty seven participants responded to post-course surveys. Of these, 93 percent indicated that the course they participated in met or exceeded their expectations. Ten respondents (6 percent) indicated that the course did not meet their expectations. Most (95 percent) agreed or strongly agreed that the course was well organized.



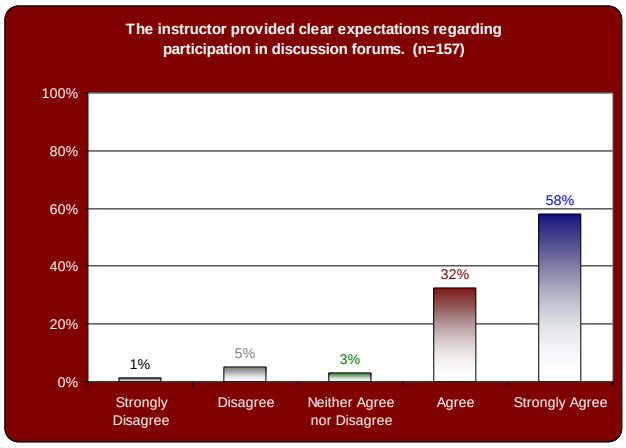


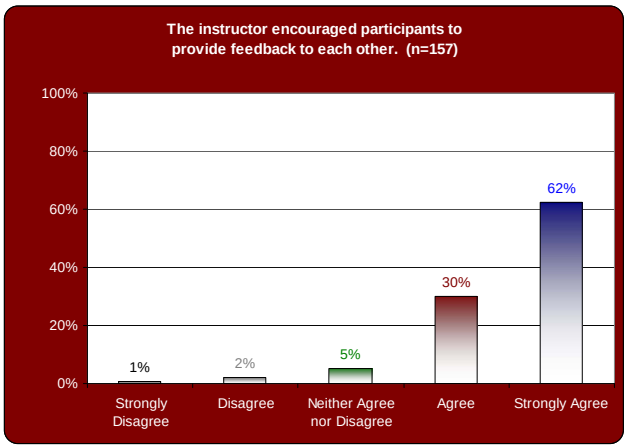
Most also agreed or strongly agreed that the learning objectives for the course were clearly documented and that the instructor inspired interest in the course (95 percent and 87 percent respectively).



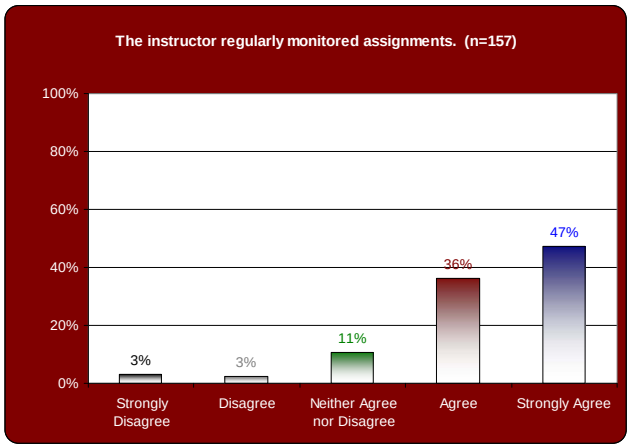


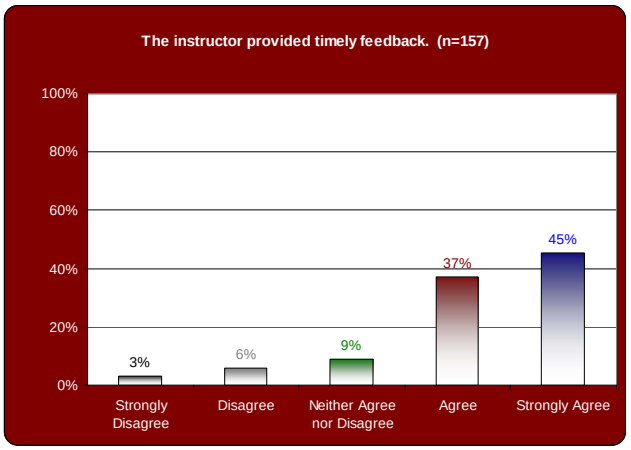
Eighty-nine percent of respondents agreed or strongly agreed that the instructor provided clear expectations regarding participation in discussion forums, and 82 percent indicated that the instructor encouraged participants to provide feedback to each other.



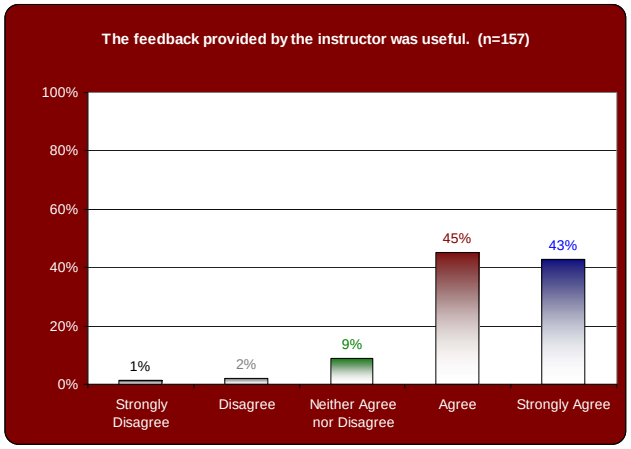


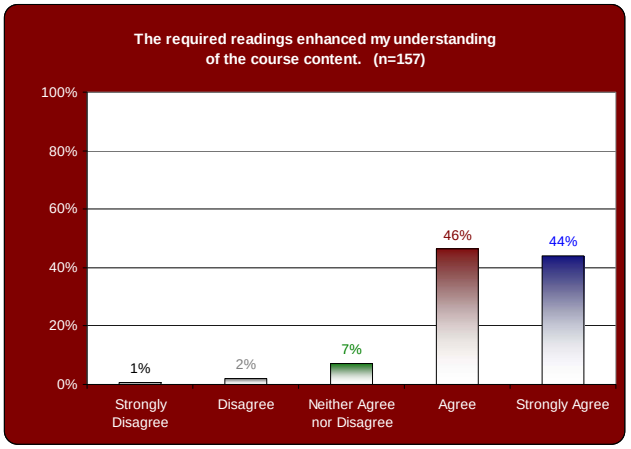
Regarding instructor feedback and monitoring of assignments, 83 percent indicated the instructor regularly monitored assignments and 82 percent reported the instructor provided timely feedback.



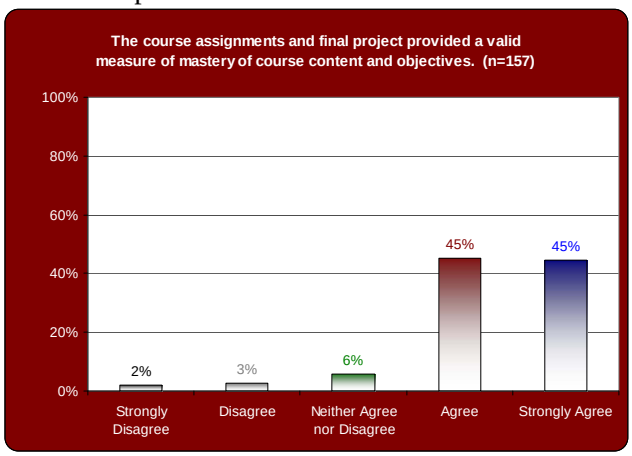


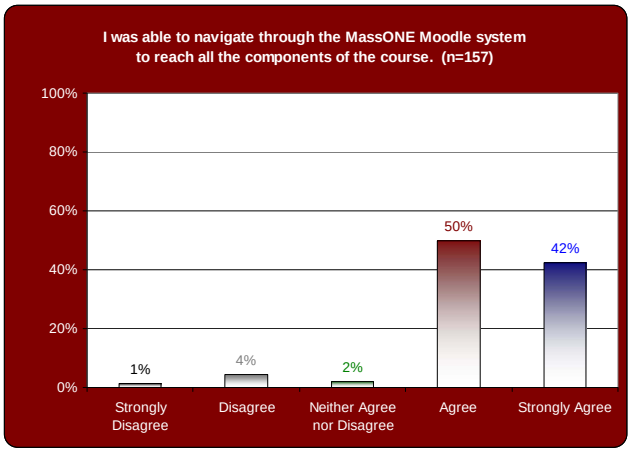
Instructor feedback was useful according to 78 percent of respondents and required readings enhanced understanding of course content according to 90 percent of respondents.



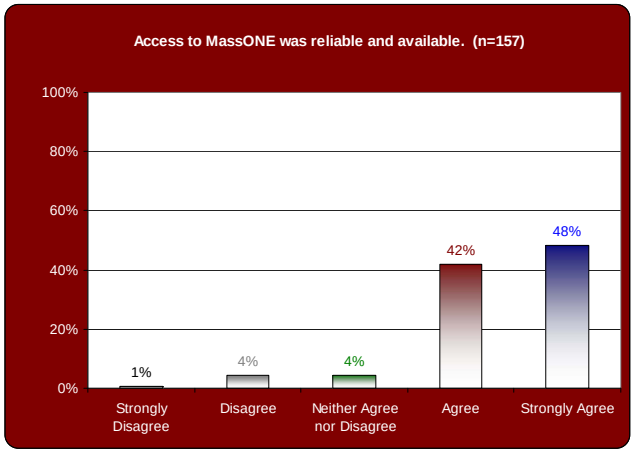


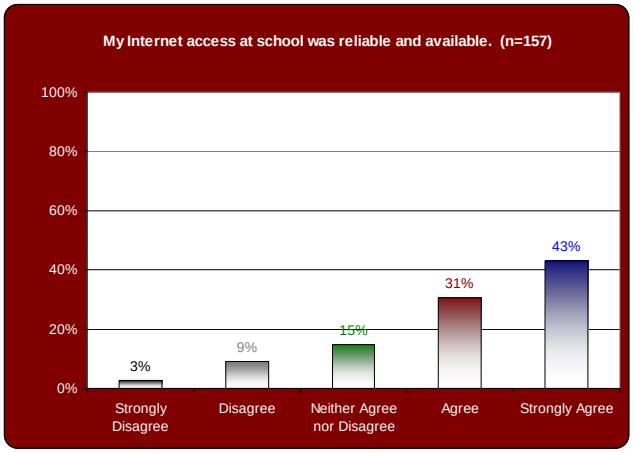
Most (90 percent) indicated that course assignments and final project were valid measures of course content and objectives. Additionally 92 percent were able to navigate through the MassONE Moodle system to reach all course components.



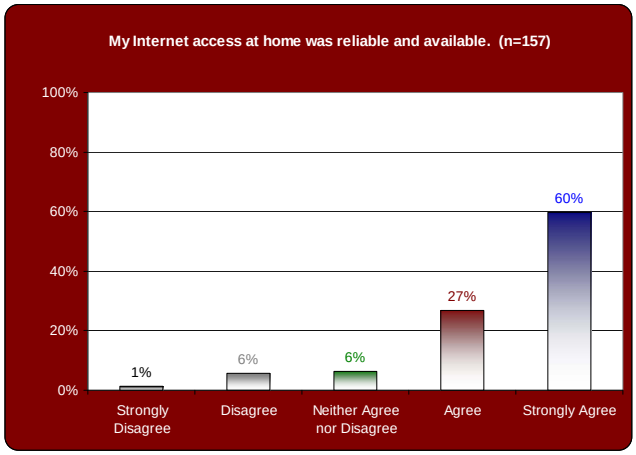


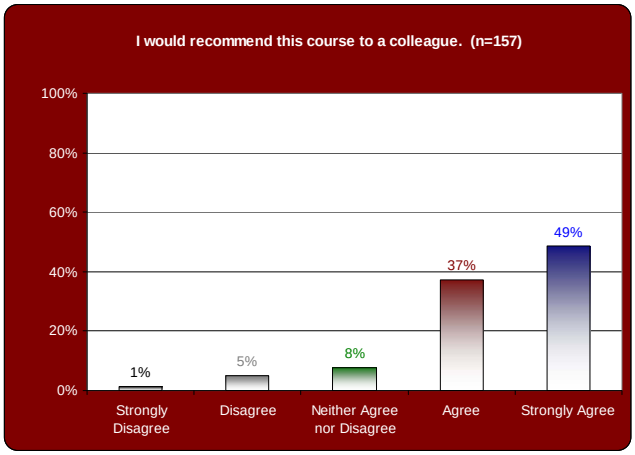
Access to MassONE was reliable and available according to 90 percent of respondents, though only 74 percent indicated that Internet access was reliable and available at school.



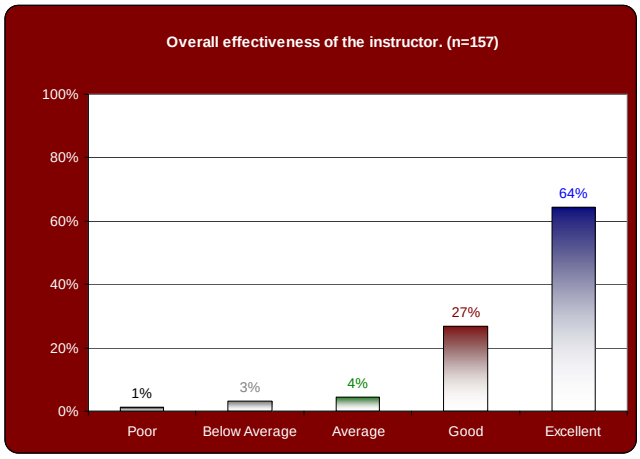


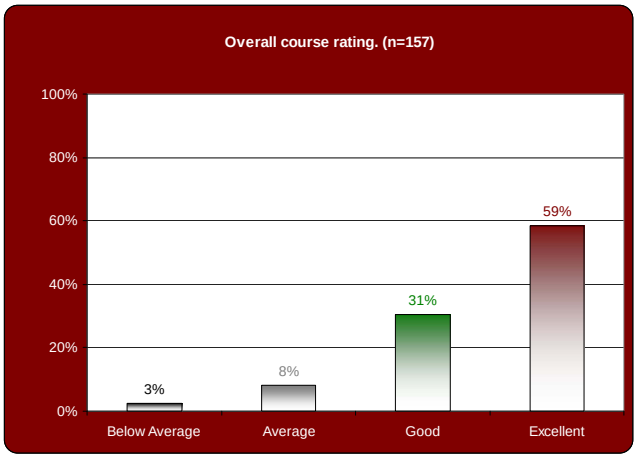
Internet access at home was reported to be reliable and available by 77 percent of respondents. Eighty-six percent indicated they would recommend the course they took to a colleague.





Overall instructor effectiveness was rated excellent by almost two-thirds of respondents and good by another 27 percent. Overall course ratings were rated excellent or good by 89 percent of all respondents.





Open-ended post-course survey questions are summarized below. Though respondents participated in different courses, responses are presented in aggregate form due to the overarching themes identified across courses.

What were the most significant strengths of this course?

One hundred and twenty-three participants responded to this question. Forty-seven (38 percent) said that the content was the most significant strength of the course. Many people commented on the quality of the readings and the video clips, saying that they were informative and helpful. A few participants said that they found the tasks/problems assigned by the instructors meaningful to their learning. The second most often noted strength was the opportunity to dialogue with other professionals from various grade levels, schools, and districts via the online forums. Forty-two participants (32 percent) commented on this strength, with many saying that it was a great opportunity to share material, resources, and ideas.

Thirty-three participants (27 percent) said that the greatest strength was the applicability of the course material to their own teaching. Participants spoke about getting ideas for lesson plans, new technology, and games and activities for their classrooms. Twenty-one participants (17 percent) spoke specifically about new resources, such as relevant Web sites, as a major strength. Sixteen participants (13 percent) said the most significant strength was the course's design—that is, the course was well-organized, with clear objectives, expectations, and assignments. One participant wrote, "It was exceptionally well organized and the criteria was explicit." Thirteen participants said that the course stimulated new thinking, 10 noted the convenience of being able to access the course at any time and from any location, 7 said the instructor was the greatest strength, and a few others said it was the technology and exposure to new technology.

What was most challenging about this course?

One hundred and twenty-three participants responded to this question as well. Of these, approximately half (n=63) mentioned issues of time as the greatest challenge faced while taking this course. Within this category however, there were distinctions made about why time was a challenge. For example, 43 percent of those who mentioned time said that the course's workload was too demanding and took too much time to complete. Some said that it was too much work for the PDPs offered, and others mentioned that it should have been worth more than three graduate credits. Participants in the Earth Science course were the most vocal about the workload with 60 percent (9 of the 15 participants in this course) reporting that it was too much work. Other participants spoke about the

difficulty of finding or managing time with busy schedules of work and family. Twenty-two reported that "finding time" to do the readings, watch the videos, and/or participate regularly in the forums was the most challenging aspect of the course. The majority of these responses (n=16) focused on the forum. Participants struggled to read everyone's posts and respond or to complete all of the reading and then post a comment in a timely fashion. Fourteen participants expressed the challenge as "managing time" well.

Participants mentioned technology as the second largest challenge, with 38 (31 percent) making reference to it. Twenty-four of these participants reported general technological difficulties, such as learning how to navigate the course's Web site or learning how to perform various functions for the course, such as posting a comment in the discussion forum or using Microsoft Word to format a document (creating charts, graphics, etc. that depict mathematical functions, such as fractions). Eight participants reported that their technological difficulties were specifically with accessing course material. They had difficulty with home and/or school computers that for whatever reason were not able to access the material, such as the videos or the Elluminate session. Six participants said specifically that Moodle was the biggest challenge, and three said that the Elluminate session was the most challenging.

Thirty-one participants (25 percent) said that the content was the most challenging thing about the course. Of these, 14 mentioned the content as challenging either because of the concepts themselves or because of a lack of interest in the content. Some participants (n=8) articulated that the content forced them to examine their own ways of thinking, which was challenging. Another six said that transferring content or new knowledge to the classrooms was the greatest challenge for logistical reasons because the course content did not fit their grade level, or because it was simply difficult to design the lesson plans using their new learning.

Seven participants (6 percent) said that a lack of timely feedback from instructors was the greatest challenge they faced. The remaining challenges, mentioned by 3 percent or fewer of participants, were the lack of face-to-face interactions, not having their own classroom to work with, difficulty with the forums (e.g. forced dialogue, knowing when to respond or when not to respond to a posting), and a lack of clarity regarding things such as assignments.

How could this course be improved?

One hundred and eighteen participants responded to this question, and 32 (27 percent) wrote that they had no suggestions for improving the course. In fact, the majority of these (n=22) wrote that they were very pleased with the course as it was. Enhancing the interactions among course participants was the second most common response with 20 percent (n=23) making reference to it. Eight participants (7 percent) suggested including times when class members come together online to discuss material, such as with weekly chat sessions. Seven participants (6 percent) recommended having a get-together at the end of the course to interact with classmates in person. Six participants (5 percent) suggested that the forum needed to change, but didn't always know how. For example, one participant complained that the postings became repetitive, and others suggested that the dialogue needed to have more structure. Two participants (who happened to be in the same course – Circuits) simply stated that there should be more interaction among participants, but did not elaborate on how that should happen.

Twenty percent of participants (n=23) also recommended some changes to the content and/or curriculum. Thirteen percent (n=15) spoke in general terms about ways in which the content might be altered, such as changing some of the readings or making specific adjustments to some of the assignments. Four participants coincided in recommending adjusting the journal assignment, and another four recommended changes to the final project.

Seventeen percent (n=20) made suggestions related to the amount of time available to finish the work, or the amount of work itself. Participants were somewhat evenly split as to how to address this issue. Eight (7 percent)

said that the amount of time given to complete assignments should be increased or that the scheduling of assignments should be altered. Seven participants (five of whom were in the Earth Science course) suggested reducing the workload, perhaps by streamlining various tasks. Five participants (4 percent) suggested increasing the number of weeks of the course–for example, to 12 weeks–in order to complete all of the work.

Fourteen percent (n=16) felt that the course could be improved if instructors provided more timely, descriptive, and individualized feedback on assignments. Eleven participants (9 percent) suggested offering more technical support. The remaining suggestions given for improving the course, mentioned by 3 percent (n=3) of participants, were to provide a means of sharing student work with other people in the course, award more credits for the course, and provide more clarity and organization regarding course expectations and assignments.

Any other comments?

Sixty-three participants provided additional comments, the majority of which were positive in nature. Twenty-one participants (33 percent) said that they thought the course was an overall great experience. Thirteen (21 percent) wrote about the instructor and his/her support, patience, and responsiveness to questions. Six of the 13 (46 percent) who spoke highly about the instructor were from the Fractions course; participants were very enthusiastic about this instructor and two said that they hope she teaches again in the future. Twelve participants (19 percent) spoke about the applicability of the course material to the classroom (five of these–42 percent –were from the UDL Smith Vocational course). Eleven participants spoke about the new learning that they experienced, and seven mentioned the quality of the course content. Six participants said that they would recommend the course to others; five of the six (83 percent) were from the Number Sense course. Five participants said “thank you” and four said that they enjoyed the forum experience and the exchange of ideas.

There was also some feedback as to things that did not fare well for participants. Four participants (5 percent) were disappointed with the level of feedback and interaction from the instructor and three participants (4 percent) said that the course was too time consuming.

Content-Specific Pre– Post–Tests

The results of the pre- post-tests are provided in the table below. In all courses, mean gain scores indicated overall improvements in content knowledge, many of which were statistically significant.

Course	N	Mean Pre-Score	Mean Post-Score	Gain Score
Algebraic Thinking***	19	46.3%	69.5%	23.2%
Circuits***	21	70.0%	84.3%	14.3%
Earth Space Science	9	78.9%	86.1%	7.2%
Elementary Life Science*	14	73.9%	81.1%	7.2%
Fractions	15	91.2%	94.5%	3.3%
Number Toolkit**	21	80.1%	90.0%	9.9%
UDL Brockton***	17	53.5%	79.1%	25.6%
UDL Smith Vocational**	19	59.1%	84.9%	25.8%
Real Data *	15	57.0	67.6	10.6%

Gain scores are statistically significant: *p<.05, **p<.01, ***p<.001

Phone Interviews

The following questions were asked of all participants who took part in the phone interviews upon completion of the POPD courses. Twenty-five participants were randomly selected across the courses, though after several attempts, responses were gathered from 18 of these individuals.

Did the course meet your expectations, and how or how not?

All 18 participants indicated that the course did meet their expectations, although one participant said both "yes" and "no." The ways in which the course met respondents expectations included the quality of the content (n=9), and new ideas and strategies for better teaching (n=6). Other comments included increased content knowledge, expansion in methods of thinking, access to quality resources, and enjoyment of discussion forums. A few participants reported the ways the course did not meet their expectations, which included a too demanding workload which did not allow sufficient time to complete assignments (n=3). One other respondent felt the frequent requirement of posting comments in discussion forums resulted in less thoughtful or engaging postings. This person also expressed frustrations with the Moodle system and technology related to the course in general.

What is your opinion of Moodle, in terms of system strengths and weaknesses?

Approximately three-fourths of those interviewed (n=13) said that they liked Moodle. Some (n=5) reported that initially they found it confusing, but they quickly became comfortable using Moodle and reported that it was well-organized and easy to use. One respondent said that the interaction between students and the instructor via postings on Moodle was better than the interactions that he/she experienced in regular classroom settings. Another said that he/she liked being able to find everything on the MassONE Web site and a final comment included praise for the Notebook feature of Moodle.

Criticisms of Moodle included difficulty logging into the course or accessing it from various computers, e.g. could access it at home but not at work, or vice versa (n=5), difficulty with various system components, e.g. journal entries, "block/unblock" (n=4), and with the Elluminate session (n=2). One respondent said that Moodle was confusing and not "intuitive," and another said that it could be made more user-friendly.

What technology skills would you say are the most important for teachers to be able to successfully participate in this course and/or to complete the course requirements?

In response to this question, half of the participants (n=9) indicated an ability to navigate the Internet, for example to conduct a basic Web search. They suggested that familiarity with certain Internet applications would be useful, including knowing how to download and upload documents, attach a document to e-mail, convert Web information into other formats (e.g. Microsoft Word), use links to other Web sites, and participate in the discussion forums. One respondent also indicated the importance of being able to manage a lot of material in different windows simultaneously.

Eight respondents said that one needs basic computer skills in order to participate successfully in this course. This included a familiarity with Microsoft Word and Excel, a technological curiosity, and time to explore and figure things out on one's own.

What were the advantages and/or disadvantages of taking this course online?

The advantage most often noted by participants was the convenience of taking an online course. Almost 80 percent (n=14) said that not having a fixed time or location for class and being able to access the course whenever one chose made the online course very convenient. Five felt that the discussion forum was an advantage of taking

the course online, and mentioned the online resources for the course material, such as visual demonstrations of how to complete mathematics problems or various Web sites/resources as strengths. A few participants spoke about the implications that the course had for their classroom teaching and the benefits of becoming more technologically savvy in the classroom as well as the benefits of access to teachers from other districts who could share new ideas with class members. The greatest disadvantage to taking the course online, according to seven participants, was its impersonal nature and lack of face-to-face interaction. A few others noted the general time commitment and technology issues as the biggest disadvantages.

Do you have any other comments or suggestions you'd like to share about the course or the Moodle system?

Approximately half of the participants (n=10) made general comments about the overall quality of the course. Some appreciated the content, others appreciated that the course was well-organized, and some simply said that they enjoyed the course. Of these, four said that they would recommend the course to others and/or were looking forward to taking another course. Five remarked on the quality of the interactions between the instructor and the students, saying that the instructor was accessible and provided feedback when appropriate. Three said that they really liked Moodle as a vehicle for an online course, one participant indicated that he/she enjoyed the forum discussions, and another said that he/she saw immediate benefits with students in the classroom after using material from the (UDL Brockton) course.

Participants also provided some recommendations for how to improve the course. Two suggested that the workload needed to be more balanced. One felt that the workload was too light (Algebraic Thinking) and another felt it was too heavy (UDL Smith Voc). Another participant simply said that future students need to understand how much time they will have to devote to an online class in order to get the work done. Also, one participant said that more clarity regarding course expectations and assignments (UDL Smith Voc) would have been beneficial.

In terms of logistics, one participant said that it would have been helpful to be able to access future sessions of the course in advance in order to start the work early. This participant also reported that registering through Salem State College was an extremely cumbersome process, while registering through Fitchburg State College was much easier.

One participant remarked that he/she loved the course but struggled with the technology, which provided some support for the relevancy of a suggestion made by another participant to offer on-site technology training. This participant felt that not only would it be a support for current students who needed it, but it would also encourage those who might not take the course because of a discomfort with technology to go ahead and do so. Another suggestion was to reduce the number of students in each course in order to allow the instructor to be more deeply engaged with participants and the material and to provide more timely feedback. Finally, one participant suggested setting up a discussion forum for teachers in all districts across the state so that ideas and strategies could be shared.

Conclusion

The Massachusetts Department of Elementary and Secondary Education provided funding for nine online courses to be piloted in eight districts during the spring 2008[10]. Course participants completed pre-course surveys (n=199), post-course surveys (n=157), content-specific pre- post-tests (n=150) and phone interviews (n=19). Based on the available data, all courses were successful in meeting previously defined course success criteria.

- In every course, the results of pre- post-testing indicated improvements in content knowledge, many of which were statistically significant.
- 93 percent of all participants indicated their course met or exceeded their expectations.
- 89 percent of all participants rated the overall course as excellent or good.
- 91 percent rated the overall effectiveness of the instructor as excellent or good.
- 86 percent indicated they would recommend the course they took to a colleague.
- 95 percent agreed or strongly agreed that the course was well organized and that the learning objectives for the course were clearly documented.
- 87 percent agreed or strongly agreed that the instructor inspired interest in the course.
- 89 percent indicated that the instructor provided clear expectations regarding participation in discussion forums.
- 82 percent reported that the instructor encouraged participants to provide feedback to each other.
- 83 percent indicated the instructor regularly monitored assignments.
- 82 percent reported the instructor provided timely feedback and 78 percent indicated that instructor feedback was useful.
- 90 percent indicated that required readings enhanced understanding of course content and that course assignments and final projects were valid measures of course content and objectives
- 92 percent were able to navigate through the MassONE Moodle system to reach all course components.
- 90 percent reported that access to MassONE was reliable and available.

The most significant course strengths noted included:

- high quality of course content
- opportunity to communicate with professionals from other schools/districts and to share material, resources, and ideas

[10] One course was piloted during the fall 2007, however findings from this course are being reported with spring 2008 course findings.

- applicability of course materials and resources to classroom teaching (e.g., generated new ideas for lesson plans, technology, games, and activities for participants' classrooms)
- clarity of course design—courses were well organized, with clear objectives, expectations and assignments
- stimulation of new thinking
- convenience of learning online
- high quality instructors

The most frequently notes course challenges included:

- having/making enough time to complete course requirements—very rigorous courses
- general technological issues
- specific course content (e.g. difficult concepts, challenged participants' ways of thinking, transferring content to the classroom)

Recommendations for improvement were somewhat limited and included a few suggestions for enhancing the interactions among course participants, the possibility of scheduling times when class members could come together online to discuss material (e.g. weekly chat sessions), and/or having a face-to-face session at the end of the course to interact with classmates in person. Some suggestions were also made regarding changes to the course content and/or curriculum, though most of these were rather general. A few comments were made regarding ideas to address the issues of not having enough time to complete course work, including being granted more time or reducing the workload. Several participants (n=16) also report that the course could be improved if instructors provided timelier, descriptive, and individualized feedback on assignments.

Next Steps: The Donahue Institute will continue to work with all grant recipients as they proceed with the next phase of the grant process. Feedback surveys will be developed and ongoing support will be provided to projects as summer courses are implemented and data collection continues.

Appendix A: Post-Course Survey Results by Course

Based on your expectations for this course, which statement most accurately reflects your opinion?

	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
The course did not meet my expectations.	1	0	1	3	1	1	2	1	0	10
The course met my expectations.	11	4	4	6	9	4	8	14	10	70
The course exceeded my expectations.	10	7	10	6	10	11	9	6	8	77
Total	22	11	15	15	20	16	19	21	18	157

The course was well organized.

	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Disagree	0	0	0	2	0	0	1	0	0	3
Neither Agree nor Disagree	0	0	0	0	0	1	3	0	0	4
Agree	8	7	4	7	5	4	6	8	8	57
Strongly Agree	14	4	11	6	15	11	9	13	10	93
Total	22	11	15	15	20	16	19	21	18	157

The instructor inspired interest in the course material.

	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Strongly Disagree	0	0	0	1	0	0	0	0	0	1
Disagree	1	0	0	2	1	1	0	0	0	5
Neither Agree nor Disagree	2	1	0	4	0	0	3	3	2	15
Agree	9	5	3	3	9	5	7	7	9	57
Strongly Agree	9	5	12	5	10	10	9	11	7	78
Total	21	11	15	15	20	16	19	21	18	156

The instructor provided clear expectations regarding participation in discussion forums.										
	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Strongly Disagree	0	0	0	1	0	0	0	1	0	2
Disagree	0	1	0	4	0	1	1	1	0	8
Neither Agree nor Disagree	0	2	1	0	0	0	2	0	0	5
Agree	11	4	3	3	4	2	8	9	7	51
Strongly Agree	11	4	11	7	16	13	8	10	11	91
Total	22	11	15	15	20	16	19	21	18	157

The instructor encouraged participants to provide feedback to each other.										
	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Strongly Disagree	0	0	0	1	0	0	0	0	0	1
Disagree	0	0	0	2	0	1	0	0	0	3
Neither Agree nor Disagree	1	3	0	3	0	0	1	0	0	8
Agree	8	5	2	4	6	3	7	7	5	47
Strongly Agree	13	3	13	5	14	12	11	14	13	98
Total	22	11	15	15	20	16	19	21	18	157

The instructor regularly monitored assignments.										
	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Strongly Disagree	0	0	0	4	0	0	1	0	0	5
Disagree	0	1	0	1	0	0	1	1	0	4
Neither Agree nor Disagree	4	1	0	2	1	1	3	2	3	17
Agree	10	8	2	4	8	3	7	7	8	57
Strongly Agree	8	1	13	4	11	12	7	11	7	74
Total	22	11	15	15	20	16	19	21	18	157

The instructor provided timely feedback.	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Strongly Disagree	0	0	0	4	0	0	1	0	0	5
Disagree	1	2	0	1	0	2	2	1	0	9
Neither Agree nor Disagree	1	3	0	6	0	0	1	2	1	14
Agree	12	5	4	3	12	4	7	4	7	58
Strongly Agree	8	1	11	1	8	10	8	14	10	71
Total	22	11	15	15	20	16	19	21	18	157

The feedback provided by the instructor was useful.	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Strongly Disagree	0	0	0	2	0	0	0	0	0	2
Disagree	0	0	0	0	0	1	2	0	0	3
Neither Agree nor Disagree	2	1	0	1	2	0	3	3	2	14
Agree	14	5	6	7	9	6	7	8	9	71
Strongly Agree	6	5	9	5	9	9	7	10	7	67
Total	22	11	15	15	20	16	19	21	18	157

The required readings enhanced my understanding of the course content.	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Strongly Disagree	0	0	0	0	0	0	1	0	0	1
Disagree	0	0	0	1	0	1	0	0	1	3
Neither Agree nor Disagree	1	0	1	1	2	2	1	0	3	11
Agree	9	5	9	8	8	7	7	11	9	73
Strongly Agree	12	6	5	5	10	6	10	10	5	69
Total	22	11	15	15	20	16	19	21	18	157

The course assignments and final project provided a valid measure of mastery of course content and objectives.										
	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Strongly Disagree	0	0	1	0	0	0	0	1	1	3
Disagree	0	0	0	3	0	0	1	0	0	4
Neither Agree nor Disagree	1	2	0	0	0	1	2	1	2	9
Agree	7	5	4	6	11	6	10	10	11	70
Strongly Agree	14	4	10	6	9	7	6	9	4	69
Total	22	11	15	15	20	14	19	21	18	155

I was able to navigate through the MassONE Moodle system to reach all the components of the course.										
	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Strongly Disagree	0	0	0	1	0	1	0	0	0	2
Disagree	1	1	0	1	1	1	1	0	1	7
Neither Agree nor Disagree	0	1	0	0	0	0	1	1	0	3
Agree	12	8	4	10	6	8	11	9	10	78
Strongly Agree	9	1	10	3	13	6	6	11	7	66
Total	22	11	14	15	20	16	19	21	18	156

Access to MassONE was reliable and available.										
	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Strongly Disagree	0	0	0	0	0	1	0	0	0	1
Disagree	1	2	0	1	0	1	1	0	1	7
Neither Agree nor Disagree	1	1	1	2	0	1	0	1	0	7
Agree	11	4	5	5	5	8	10	11	7	66
Strongly Agree	9	4	9	7	15	5	8	9	10	76
Total	22	11	15	15	20	16	19	21	18	157

My Internet access at school was reliable and available.	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Strongly Disagree	0	0	0	0	0	0	3	1	0	4
Disagree	1	2	1	0	1	2	3	2	2	14
Neither Agree nor Disagree	7	1	1	6	1	2	1	3	1	23
Agree	8	2	4	5	7	5	4	7	6	48
Strongly Agree	6	6	9	4	11	6	8	8	9	67
Total	22	11	15	15	20	15	19	21	18	156

My Internet access at home was reliable and available.	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Strongly Disagree	0	0	0	0	0	0	1	0	1	2
Disagree	2	0	0	0	1	1	2	2	1	9
Neither Agree nor Disagree	1	0	1	1	0	2	1	2	2	10
Agree	6	2	5	5	4	7	3	6	4	42
Strongly Agree	13	9	9	9	15	5	12	11	10	93
Total	22	11	15	15	20	15	19	21	18	156

I would recommend this course to a colleague.	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Strongly Disagree	0	0	0	1	0	0	1	0	0	2
Disagree	1	0	0	3	0	0	1	1	2	8
Neither Agree nor Disagree	0	0	1	2	0	2	3	2	2	12
Agree	11	6	3	5	9	3	7	7	7	58
Strongly Agree	10	5	11	4	11	10	7	11	7	76
Total	22	11	15	15	20	15	19	21	18	156

Overall effectiveness of the instructor.										
	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Poor	0	0	0	2	0	0	0	0	0	2
Below Average	0	0	0	2	0	1	1	1	0	5
Average	2	1	0	1	0	0	1	1	1	7
Good	6	3	1	3	6	4	7	4	8	42
Excellent	14	7	14	7	14	11	10	15	9	101
Total	22	11	15	15	20	16	19	21	18	157

Overall course rating.										
	Circuits	Earth Science	Fractions	Life Science	Number Toolkit	UDL Brockton	UDL Smith Voc	Algebraic Thinking	Using Real Data	Total
Below Average	0	0	0	1	0	1	1	0	1	4
Average	2	0	0	3	1	0	2	3	2	13
Good	5	4	5	4	7	4	8	3	8	48
Excellent	15	7	10	7	12	11	8	15	7	92
Total	22	11	15	15	20	16	19	21	18	157